

Claims

I claim:

- 1 1. A method for fabricating a magnetic recording head comprising:
 - 2 providing a substrate;
 - 3 depositing a magnetically permeable thin film onto the substrate;
 - 4 defining a gap pattern;
 - 5 milling the gap pattern with a focused ion beam.
- 1 2. The method of claim 1, further comprising coupling the substrate to a coil which
 - 2 controllably causes magnetic flux to flow through the substrate and the thin film.
- 1 3. The method of claim 1, wherein providing a substrate further comprises:
 - 2 bonding two ferrite blocks to a ceramic member; and
 - 3 polishing an upper surface of the bonded blocks and ceramic member.
- 1 4. The method of claim 3, further comprising grinding the upper surface to produce a
 - 2 curvature, prior to polishing.
- 1 5. The method of claim 1, wherein depositing a thin film further includes sputtering a
 - 2 material onto the substrate to produce the thin film.
- 1 6. The method of claim 5 wherein the sputtered material has a high magnetic moment
 - 2 density.
- 1 7. The method of claim 5 wherein the sputtered material is chosen from the family of iron
 - 2 nitride alloys.
- 1 8. The method of claim 5 wherein the material is FeXN.
- 1 9. The method of claim 5 wherein the material is FeAlN.

1 10. The method of claim 5 wherein the material is FeTaN.

1 11. The method of claim 5 wherein the material is sputtered to form a thin film having a
2 thickness between 1 to 5 μm .

1 12. The method of claim 1 wherein the gap pattern defined is a timing based servo pattern.

1 13. The method of claim 1 wherein defining a gap pattern further includes providing a visual
2 indication of the pattern on the thin film.

1 14. The method of claim 13 wherein the gap pattern defined is a timing based servo pattern.

1 15. The method of claim 13 wherein the visual indication is provided by:
2 applying a layer of photoresist over at least a portion of the thin film;
3 masking the photoresist; and
4 removing a portion of the photoresist using known chemical processes.

1 16. The method of claim 15 wherein the gap pattern defined is a timing based servo pattern.

1 17. The method of claim 1 wherein defining a gap pattern further includes entering the
2 numerical coordinates of the gap pattern into a control system of the focused ion beam.

1 18. The method of claim 17 wherein the gap pattern defined is a timing based servo pattern.

1 19. The method of claim 1 wherein the focused ion beam is substantially perpendicular to an
2 upper major surface of the thin film during milling.

1 20. The method of claim 19 wherein the gap has nearly vertical side walls.

1 21. The method of claim 1 wherein the gap has nearly vertical side walls.

1 22. A magnetic recording head made by the method of claim 1.

1 23. A method of fabricating a magnetic recording head for timing based servo tracks
2 comprising:
3 providing a magnetically permeable substrate by glass bonding two ferrite blocks to a
4 medially disposed ceramic member;
5 sputtering a magnetically permeable thin film onto one surface of the substrate thereby
6 providing a major surface;
7 defining a timing based gap pattern;
8 rastering a focused ion beam in a plane orthogonal to the plane of the major surface of the
9 thin film, milling out the thin film in the defined gap pattern;
10 coupling the substrate to a coil which controllably causes magnetic flux to flow through
11 the substrate and the thin film.

1 24. The method of claim 23 wherein the thin film is FeXN.

1 25. The method of claim 23 wherein the thin film is FeAlN.

1 26. The method of claim 23 wherein the thin film is FeTaN.

1 27. The method of claim 23 wherein the gap pattern is defined by:
2 depositing a layer of photoresist to at least a portion of the thin film;
3 masking the photoresist;
4 removing a portion of the photoresist using photolithography.

1 28. The method of claim 23 wherein the gap pattern is defined by providing a visual
2 indication of the pattern on the thin film.

1 29. The method of claim 23 wherein the pattern is defined within a control system of the
2 focused ion beam.

1 30 The method of claim 23 wherein the pattern is defined within the control system by
2 entering the numerical coordinates of the gap to be milled.

1 31. The method of claim 23 wherein the gap has nearly vertical side walls.

1 32. A magnetic recording head made by the method of claim 23.